

## CLAIMS

1. A laser diode assembly, comprising:

a carrier having a top and bottom, the top having a conductive layer  
formed thereon, the conductive layer sized for attaching at least two bonding  
members thereto;

a laser diode operably coupled to the carrier, the laser diode having first  
and second conductive pads formed thereon, the first and second conductive pads  
each sized for attaching at least one bonding member thereto;

a first bonding member coupling the first conductive pad to the conductive  
layer; and

a second bonding member coupling the second conductive pad to the  
conductive layer.

2. The laser diode assembly of claim 1 wherein the carrier comprises an insulating  
material.

3. The laser diode assembly of claim 1 wherein the carrier comprises a material  
selected from the group consisting of Si, diamond, SiC, AlN, and BeO.

4. The laser diode assembly of claim 1 wherein the laser diode has a top side and  
wherein the first and second conductive pads are formed on the top side.

5. The laser diode assembly of claim 4 wherein the first and second conductive pads  
are formed on opposing sides of the top side.

6. The laser diode assembly of claim 1 wherein the laser diode further comprises a  
laser ridge formed therein.

7. The laser diode assembly of claim 6 wherein the laser ridge is formed between at  
least a portion of the first and second conductive pads.

8. The laser diode assembly of claim 6 wherein at least one of the first and second bonding members couples its respective conductive pad to the conductive layer without passing over the laser ridge.
9. The laser diode assembly of claim 6 wherein the laser ridge is formed substantially near the top side of the laser diode.
10. The laser diode assembly of claim 1, wherein the laser diode further comprises first and second electrodes, and at least one of the first and second conductive pads is coupled to at least one of the first and second electrodes.
11. The laser diode assembly of claim 1, wherein at least one of the first and second conductive pads is constructed and arranged to dissipate heat resulting from internal power production of the laser diode.
12. The laser diode assembly of claim 1, wherein at least one of the first and second bonding members comprises a length of conductive material selected from the group consisting of wire, ribbon, braid, filament, fiber and tape.
13. The laser diode assembly of claim 1, further comprising a third bonding member operably coupling at least one of the first and second conductive pads to the conductive layer of the carrier.
14. The laser diode assembly of claim 1, wherein the conductive layer of the carrier comprises separate first and second portions, wherein at least one of the first and second bonding members is operably coupled to the first portion and at least one of the first and second bonding members is operably coupled to the second portion.

15. The laser diode assembly of claim 14, wherein the first portion is electrically isolated from the second portion.
- 5 16. The laser diode assembly of claim 1 wherein the carrier is constructed and arranged to transfer heat from its conductive layer to the bottom of the carrier.
17. The laser diode assembly of claim 16 further comprising a heat sink operably coupled to the bottom of the carrier.
- 10 18. The laser diode assembly of 17 further comprising a thermo electric cooling (TEC) device operably coupled to the heat sink.
- 15 19. The laser diode assembly of claim 1, wherein the laser diode further comprises an n-side and a p-side, and at least one of the first and second conductive pads is disposed substantially on the p-side of the laser diode.
- 20 20. The laser diode assembly of claim 1, wherein the laser diode further comprises an n-side and a p-side, and at least one of the first and second conductive pads is disposed substantially on the n-side of the laser diode.
21. The laser diode assembly of claim 1 wherein at least one of the first and second bonding members carries an electrical signal.
- 25 22. The laser diode assembly of claim 1 wherein at least one of the first and second bonding members does not necessarily carry an electrical signal.
23. The laser diode assembly of claim 1, wherein at least one of the first and second bonding members comprises a set of at least two bonding members.
- 30 24. The laser diode assembly of claim 23 wherein the number of first bonding members is equivalent to the number of second bonding members.

25. The laser diode assembly of claim 23, wherein the number of first bonding members is not equivalent to the number of second bonding members.

26. The laser diode assembly of claim 1 wherein the laser diode is a 980-nm pump laser diode.

27. The laser diode assembly of claim 1, wherein the laser diode is part of a semiconductor optical amplifier.

28. The laser diode assembly of claim 1, wherein the laser diode is part of a semiconductor modulator.

29. The laser diode assembly of claim 1 wherein the laser diode operates over at least a portion of the ultraviolet to far infrared wavelength range.

30. The laser diode assembly of claim 1 wherein the carrier is structured and arranged for mounting a laser diode thereto.

31. The laser diode assembly of claim 1, wherein the laser diode has a top side and wherein the first and second conductive pads are disposed at opposing sides of the top side of the laser diode.

32. A laser diode assembly, comprising:  
a carrier structured and arranged for mounting a laser diode chip thereto,  
the carrier comprising a first electrode area, a second electrode area, and a conductive area;  
a laser diode having a first side attached to the second electrode area of the carrier and having a second side comprising first and second conductive pads;  
a first bonding member coupling the first conductive pad of the laser diode to the first electrode area of the carrier; and

a second bonding member coupling the second conductive pad of the laser diode to the conductive area of the carrier.

33. A laser diode assembly, comprising:

- 5           a carrier having a conductive layer formed thereon;  
          a laser diode operably coupled to the carrier; and  
          a means for transferring heat generated at the diode to the conductive layer  
on the carrier, the means for transferring heat being operably coupled to the  
carrier from the laser diode.

10

34. The laser diode assembly of claim 33, wherein the carrier is constructed and  
arranged to convey heat transferred to the conductive layer to a means for cooling.

15

35. The laser diode assembly of claim 33, wherein the means for transferring heat  
comprises first and second conductive pads disposed on a side of the laser diode  
and first and second bonding members coupling the first and second conductive  
pads of the laser diode to the conductive layer on the carrier.

20

36. The laser diode assembly of claim 33, wherein the laser diode further comprises a  
laser ridge formed between the first and second conductive pads.